Bioelectrochemical denitrification

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Mediated bioelectrocatalysis is very useful system for many redox reactions. In the system, biocatalytic reaction was coupled with electrode and biocatalyst that can be occurred by an indirect method using a small redox molecule. This redox molecule functions as an artificial electron transferring agent which is called a mediator. To apply to the continuous reaction, immobilization of biocatalyst and mediator on electrode is essential. We suggest a novel method of mediator immobilization and its application to denitrification system. As a biocatalyst, permeabilized Ochrobactrum anthropi SY509 containing denitrifying enzymes; nitrate reductase, nitrite reductase, nitric oxide reductase and nitrous oxide reductase was used. Carbon nanopowder was selected as a support material to immobilize the mediator, neutral red. This support material has good electric conductivity and the electrode surface area can be increased. Neutral red was immobilized using linker. The enzyme electrode was prepared by biocatalyst and the support with immobilized mediator. This method prevented the mediator from leakage and showed high denitrification efficiency.